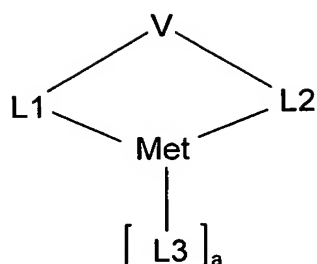


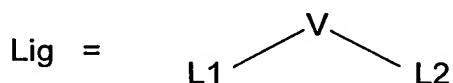
## Patent Claims:

## 1. Compounds of structure 1



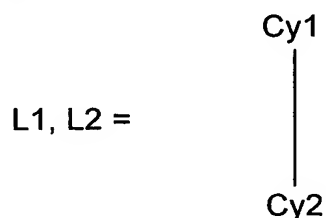
Structure 1

characterised in that they contain a metal Met, coordinated to a tetradentate chelating ligand Lig of structure 2



Structure 2

where V is a bridging unit, characterised in that it contains 1 to 40 atoms from the third, fourth, fifth and/or sixth main group and connects the two ligand moieties L1 and L2, which may be identical or different on each occurrence, covalently to one another, and where the two ligand moieties L1 and L2 satisfy structure 3



Structure 3

where Cy1 and Cy2, identically or differently on each occurrence, correspond to a substituted or unsubstituted, saturated, unsaturated or aromatic homo- or heterocyclic ring, which is in each case bonded ionically, covalently or coordinatively to the metal via a ring atom or via an atom bonded exocyclically to the homo- or heterocyclic ring;

and where L3, identically or differently on each occurrence, is a mono- or bidentate, neutral or monoanionic ligand, and where a is 0, 1 or 2.

2. Compounds according to Claim 1, characterised in that they are electrically neutral.

3. Compounds according to Claim 1 and / or 2, characterised in that  
L1 = L2.

4. Compounds according to one or more of Claims 1 to 3, characterised in that the bridging unit V contains 1 to 6 atoms or is a 3- to 6-membered homo- or hetero-cyclic ring.

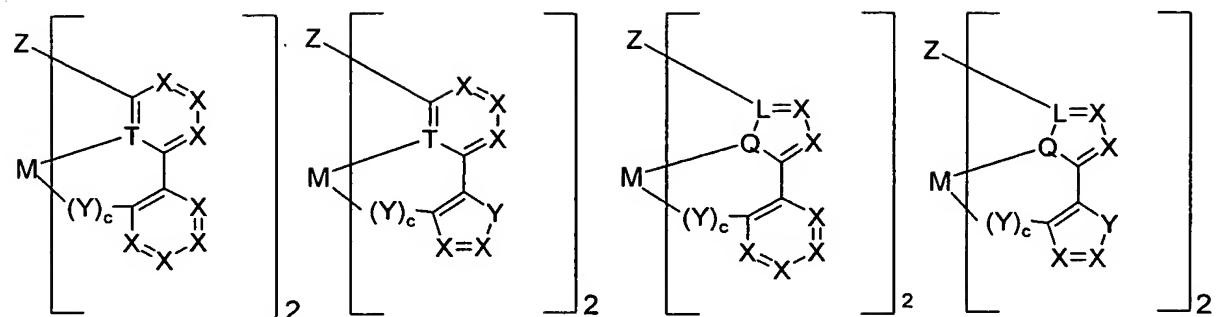
5. Compounds according to one or more of Claims 1 to 4, characterised in that the following applies to the linking unit V:

V is  $BR^1$ ,  $-(CR_2)R^1B(CR_2)-$ ,  $-O-R^1B-O-$ ,  $-O-(R^1O)B-O-$ ,  $-CR_2O-R^1B-OCR_2-$ ,  $-(CR_2CR_2)R^1B(CR_2CR_2)-$ ,  $C=O$ ,  $C=NR^1$ ,  $C=S$ ,  $CR_2$ ,  $CR(OH)$ ,  $CR(OR^1)$ ,  $C(NR^1)_2$ ,  $-(CR_2)R_2C(CR_2)-$ ,  $-(CR_2CR_2)R_2C(CR_2CR_2)-$ ,  $-(SiR_2)R_2C(SiR_2)-$ ,  $-(SiR_2CR_2)R_2C(CR_2SiR_2)-$ ,  $-(CR_2SiR_2)R_2C(SiR_2CR_2)-$ ,  $-(SiR_2SiR_2)R_2C(SiR_2SiR_2)-$ ,  $cis-RC=CR$ ,  $1,2-C_6H_4$ ,  $1,3-C_6H_4$ ,  $SiR_2$ ,  $Si(OH)_2$ ,  $Si(OR^1)_2$ ,  $-(CR_2)R_2Si(CR_2)-$ ,  $-(CR_2CR_2)R_2Si(CR_2CR_2)-$ ,  $-(SiR_2)R_2Si(SiR_2)-$ ,  $-(SiR_2CR_2)R_2Si(CR_2SiR_2)-$ ,  $-(CR_2SiR_2)R_2Si(SiR_2CR_2)-$ ,  $-(SiR_2SiR_2)R_2Si(SiR_2SiR_2)-$ ,  $R^1N$ ,  $-(CR_2)R^1N(CR_2)-$ ,  $-(CR_2CR_2)R^1N(CR_2CR_2)-$ ,  $FP$ ,  $FPO$ ,  $R^1P$ ,  $R^1As$ ,  $R^1Sb$ ,  $R^1Bi$ ,  $R^1PO$ ,  $R^1AsO$ ,  $R^1SbO$ ,  $R^1BiO$ ,  $R^1PSe$ ,  $R^1AsSe$ ,  $R^1SbSe$ ,  $R^1BiSe$ ,  $R^1PTe$ ,  $R^1AsTe$ ,  $R^1SbTe$ ,  $R^1BiTe$ ,  $-O-R^1PO-O-$ ,  $-O-(R^1O)PO-O-$ ,  $-CR_2O-R^1PO-OCR_2-$ ,  $-OCR_2-R^1PO-CR_2O-$ ,  $O$ ,  $S$ ,  $Se$ ,  $-(CR_2)O(CR_2)-$ ,  $-(CR_2)S(CR_2)-$ ,  $-(CR_2)(O)S(CR_2)-$  or  $-(CR_2)(O)_2S(CR_2)-$  or corresponding asymmetrical analogues;

R is, identically or differently on each occurrence,  $H$ ,  $F$ ,  $Cl$ ,  $Br$ ,  $I$ ,  $NO_2$ ,  $CN$ , a straight-chain, branched or cyclic alkyl or alkoxy group having 1 to 20 C atoms, where one or more non-adjacent  $CH_2$  groups may be replaced by  $-R^1C=CR^1-$ ,  $-C\equiv C-$ ,  $Si(R^1)_2$ ,  $Ge(R^1)_2$ ,  $Sn(R^1)_2$ ,  $C=O$ ,  $C=S$ ,  $C=Se$ ,  $C=NR^1$ ,  $-O-$ ,  $-S-$ ,  $-NR^1-$  or  $-CONR^1-$  and where one or more H atoms may be replaced by  $F$ , or an aryl, aryloxy or heteroaryl group having 1 to 14 C atoms, which may be substituted by one or more non-aromatic radicals R, where a plurality of substituents R may in turn define a further mono- or polycyclic, aliphatic or aromatic ring system; and

$R^1$ ,  $R^2$  are, identically or differently on each occurrence,  $H$  or an aliphatic or aromatic hydrocarbon radical having 1 to 20 C atoms.

6. Metal complexes according to one or more of Claims 1 to 5, selected from compounds (1) to (8), each of which may also carry one or two additional ligands L3

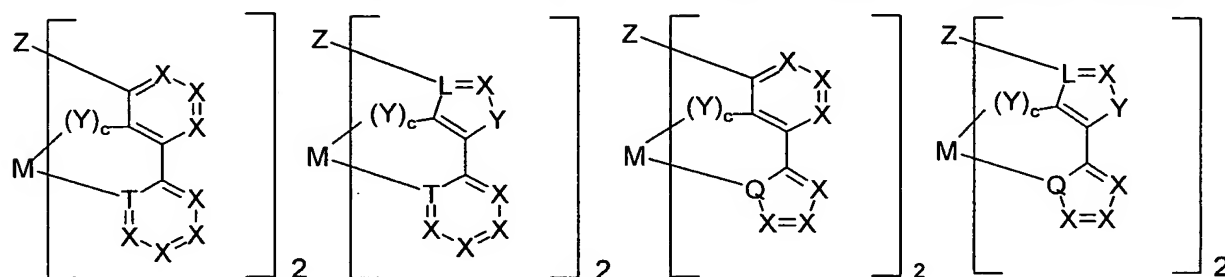


Compounds (1)

Compounds (2)

Compounds (3)

Compounds (4)



Compounds (5)

Compounds (6)

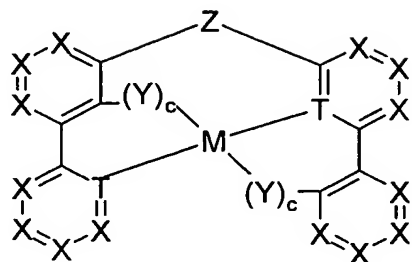
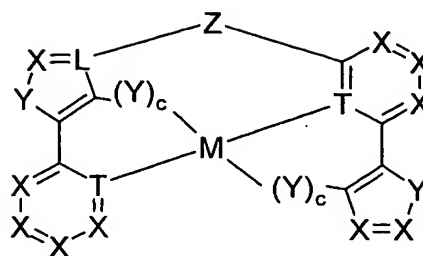
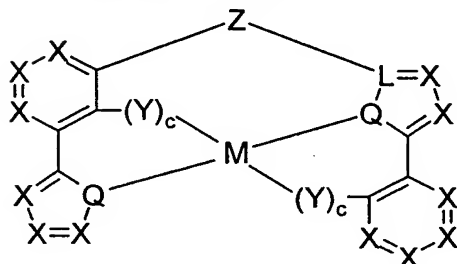
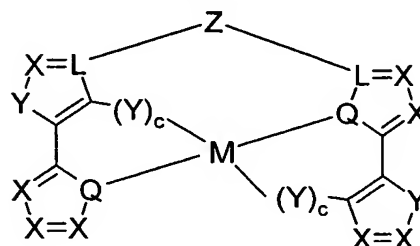
Compounds (7)

Compounds (8)

where  $R$ ,  $R^1$  and  $R^2$  have the same meaning as described in Claim 5, and the other symbols and indices have the following meaning:

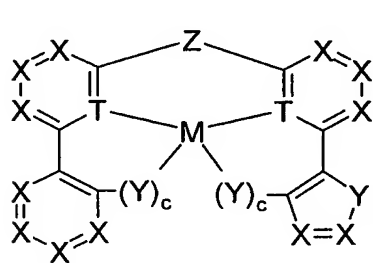
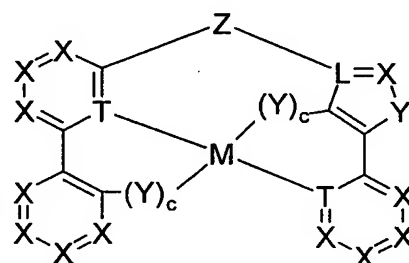
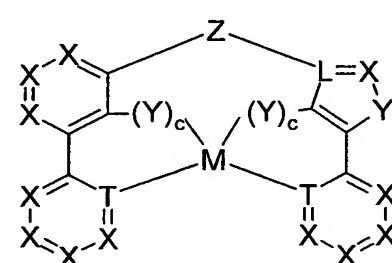
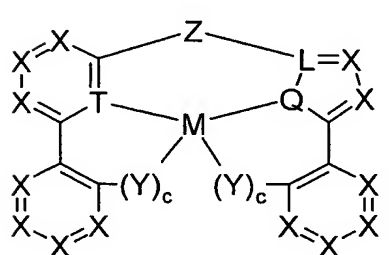
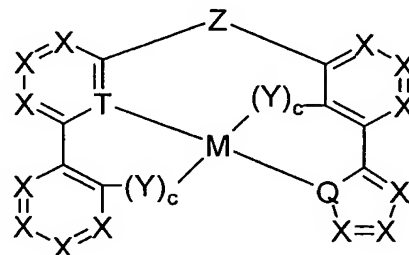
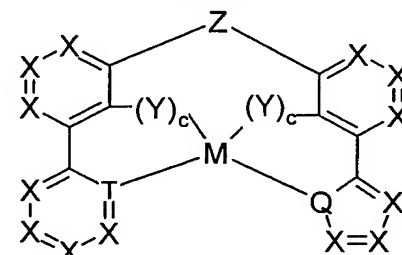
- $M$  is Be, Mg, Ca, Sr, Ba, Al, Ga, In, Tl, Sc, Y, La, Cr, Mo, W, Fe, Ru, Os, Co, Rh, Ir, Ni, Pd, Pt, Cu, Ag, Au, Zn, Cd or Hg;
- $L$  is, identically or differently on each occurrence, C, N or P;
- $Q$  is, identically or differently on each occurrence, N, O, S, Se or Te;
- $T$  is, identically or differently on each occurrence, N or P;
- $X$  is, identically or differently on each occurrence, CR, N or P;
- $Y$  is, identically or differently on each occurrence,  $NR^1$ , O, S, Se, Te, SO, SeO, TeO,  $SO_2$ ,  $SeO_2$  or  $TeO_2$ ;
- $Z$  has the same meaning as described for  $V$  in Claim 5;
- $c$  is, identically or differently on each occurrence, 0 or 1.

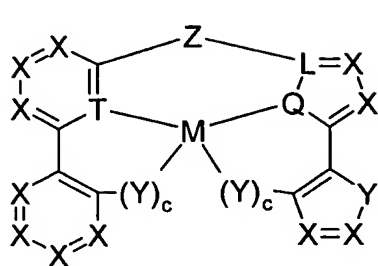
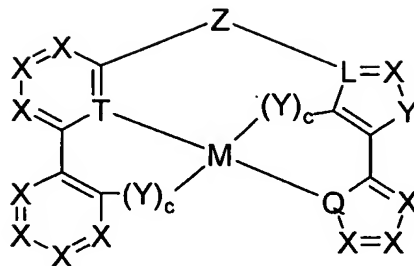
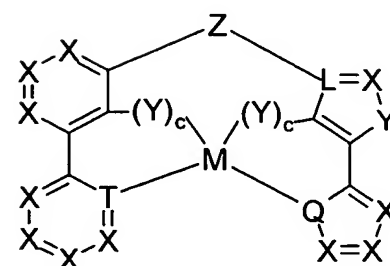
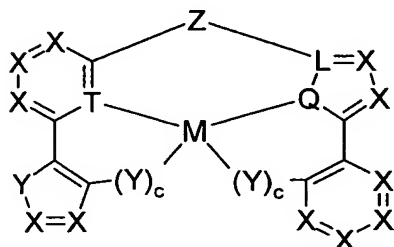
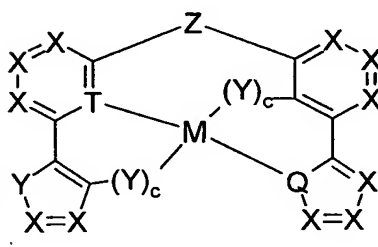
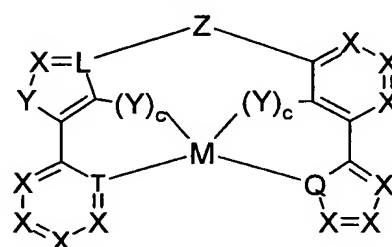
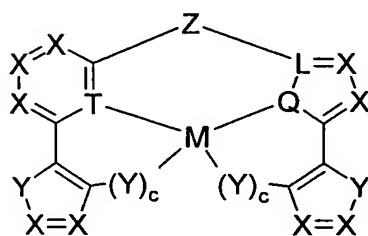
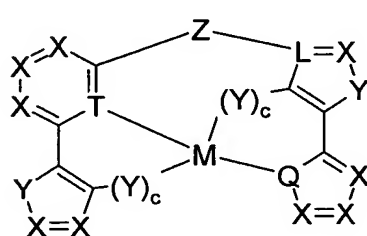
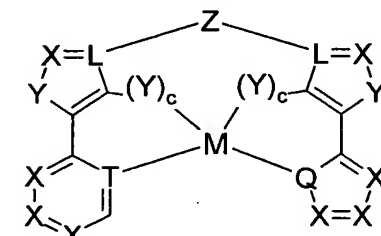
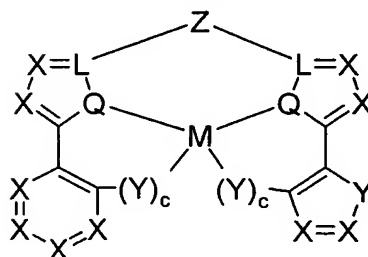
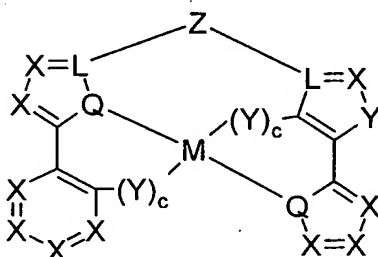
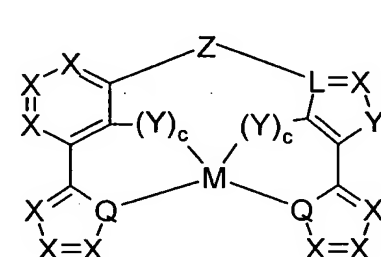
7. Metal complexes according to one or more of Claims 1 to 5, selected from compounds (9) to (12), each of which may also carry one or two additional ligands  $L_3$

**Compounds (9)****Compounds (10)****Compounds (11)****Compounds (12)**

where the symbols and indices M, L, Q, T, X, Y, Z, R, R<sup>1</sup>, R<sup>2</sup> and c have the same meanings as in Claims 5 and 6.

8. Metal complexes according to one or more of Claims 1 to 5, selected from compounds (13) to (30), each of which may also carry one or two additional ligands L<sub>3</sub>

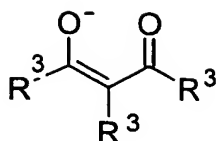
**Compounds (13)****Compounds (14)****Compounds (15)****Compounds (16)****Compounds (17)****Compounds (18)**

**Compounds (19)****Compounds (20)****Compounds (21)****Compounds (22)****Compounds (23)****Compounds (24)****Compounds (25)****Compounds (26)****Compounds (27)****Compounds (28)****Compounds (29)****Compounds (30)**

where the symbols and indices M, L, Q, T, X, Y, Z, R, R<sup>1</sup>, R<sup>2</sup>, c and n have the meanings as in Claims 5 and 6.

9. Metal complexes according to one or more of Claims 1 to 8, characterised in that ligand L3, if present, is a bidentate chelating ligand.

10. Metal complexes according to Claim 9, characterised in that L3 is a mono-anionic ligand which is identical to or different from ligand moieties L1 and L2 or in that L3 is a ligand of structure (4)



Structure (4)

where  $\text{R}^3$ , identically or differently on each occurrence, represents H, a  $\text{C}_1$  to  $\text{C}_{20}$  alkyl group, a  $\text{C}_1$  to  $\text{C}_{20}$  alkoxy group, a  $\text{C}_4$  to  $\text{C}_{20}$  aryl or heteroaryl group or a  $\text{C}_4$  to  $\text{C}_{20}$  aryloxy or heteroaryloxy group, and one or more H atoms may be replaced by F.

11. Compounds according to one or more of Claims 1 to 10, characterised in that the symbol  $\text{M} = \text{Be}, \text{Mg}, \text{Pt}$  or  $\text{Zn}$ , and the index  $a = 0$ .

12. Compounds according to Claim 11, characterised in that the symbol  $c = 0$  and  $\text{M} = \text{Pt}$ .

13. Compounds according to one or more of Claims 1 to 10, characterised in that the symbol  $\text{M} = \text{Rh}$  or  $\text{Ir}$ , and the index  $a = 1$  in the case of a bidentate monoanionic ligand  $\text{L3}$  or  $a = 2$  in the case of a monodentate monoanionic ligand  $\text{L3}$ .

14. Compounds according to one or more of Claims 1 to 13, characterised in that the symbol  $\text{L} = \text{C}$  or  $\text{N}$ .

15. Compounds according to one or more of Claims 1 to 14, characterised in that the symbol  $\text{Q} = \text{O}$  or  $\text{S}$ .

16. Compounds according to one or more of Claims 1 to 15, characterised in that the symbol  $\text{T} = \text{N}$ .

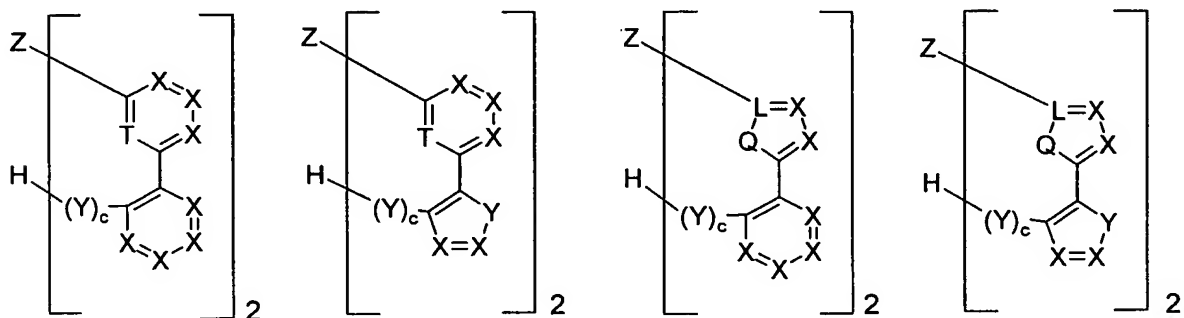
17. Compounds according to one or more of Claims 1 to 16, characterised in that the symbol  $\text{X} = \text{CR}$  or  $\text{N}$ .

18. Compounds according to one or more of Claims 1 to 17, characterised in that the symbol  $\text{Z} = \text{BR}^1, \text{CR}_2, \text{CO}, \text{SiR}^1_2, \text{R}^1\text{N}, \text{FP}, \text{FPO}, \text{R}^1\text{P}, \text{R}^1\text{PO}, -\text{CR}_2\text{CR}_2-, -\text{CR}_2-\text{O}-\text{CR}_2-, -\text{O}-(\text{OR}^1)\text{PO}-\text{O}-, \text{cis}-\text{CR}=\text{CR}, -\text{CR}_2-\text{BR}^1-\text{CR}_2-, -\text{CR}_2-\text{CO}-\text{CR}_2-, -\text{CR}_2-\text{CR}_2-\text{CR}_2- \text{ or } -\text{CR}_2-\text{NR}^1-\text{CR}_2-.$

19. Compounds according to one or more of Claims 1 to 18, characterised in that the symbol  $\text{R} = \text{H}, \text{F}, \text{Cl}, \text{Br}, \text{I}, \text{CN}$ , a straight-chain, branched or cyclic alkyl or alkoxy group having 1 to 6 C atoms or an aryl or heteroaryl group having 3 to 10 C atoms,

which may be substituted by one or more non-aromatic radicals R, where a plurality of substituents R, both on the same ring and also on the two different rings, may together in turn define a further mono- or polycyclic ring system.

## 20. Compounds (31) to (60)

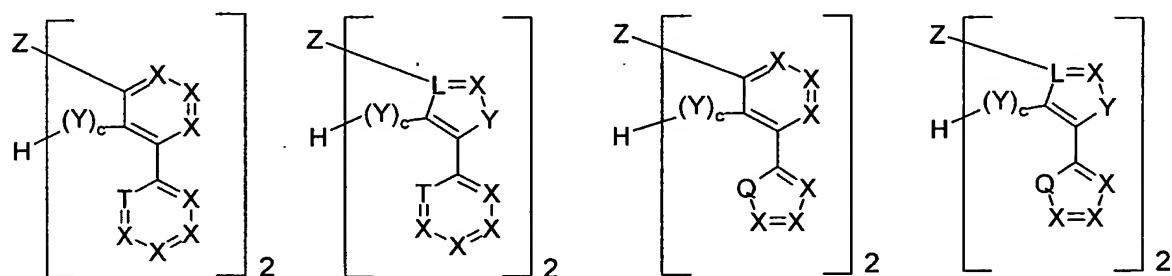


Compounds (31)

Compounds (32)

Compounds (33)

Compounds (34)

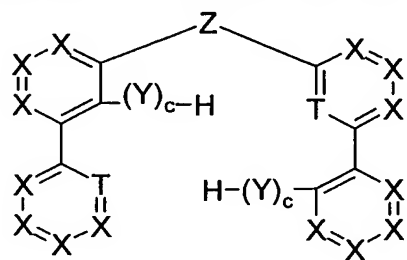


Compounds (35)

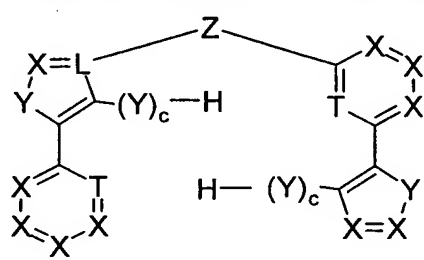
Compounds (36)

Compounds (37)

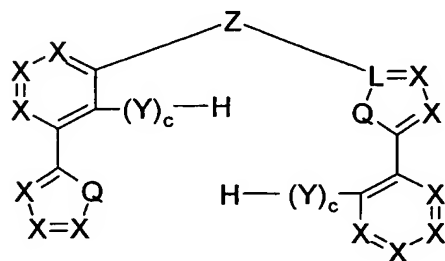
Compounds (38)



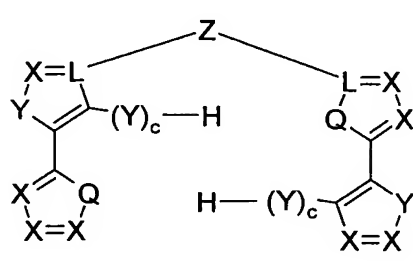
Compounds (39)



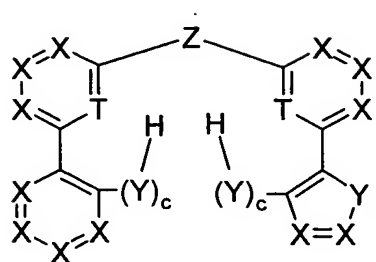
Compounds (40)



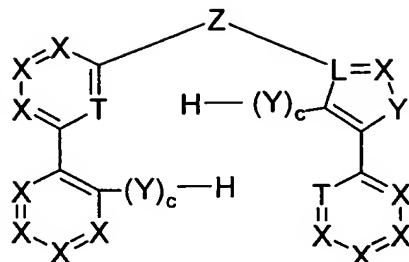
Compounds (41)



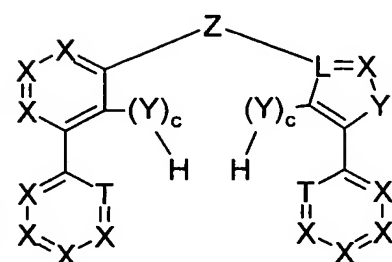
Compounds (42)



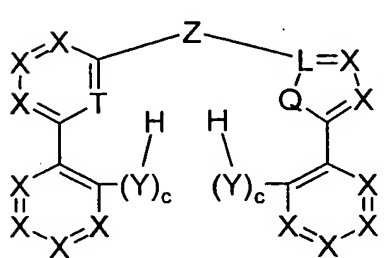
### Compounds (43)



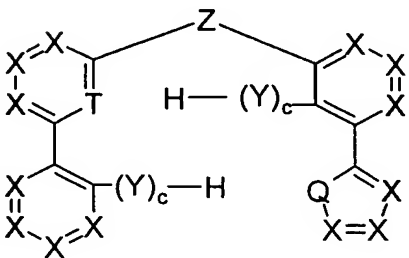
## Compounds (44)



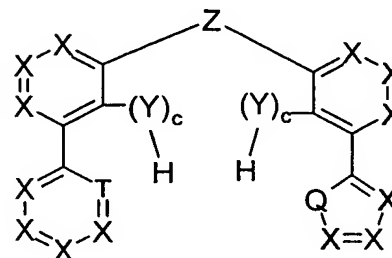
## Compounds (45)



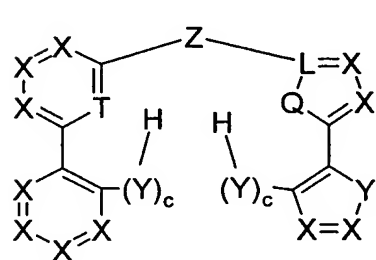
### Compounds (46)



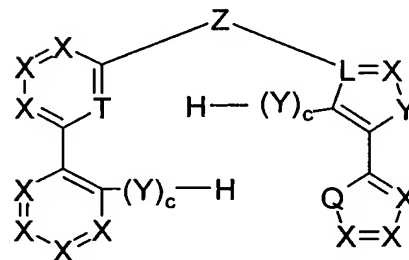
## Compounds (47)



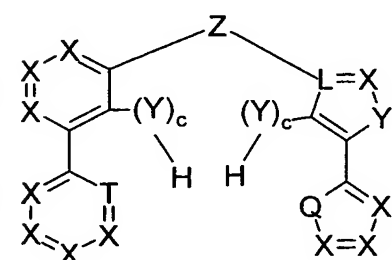
### Compounds (48)



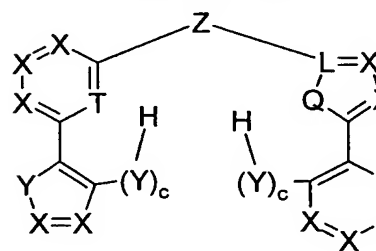
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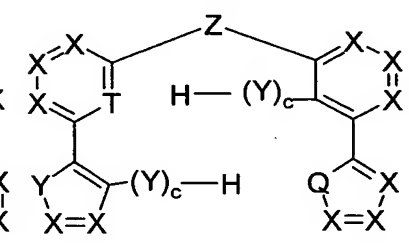
## Compounds (50)



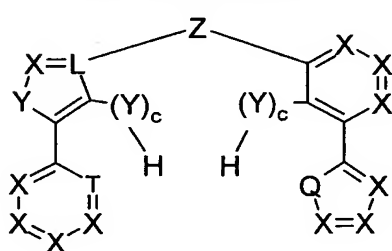
## Compounds (51)



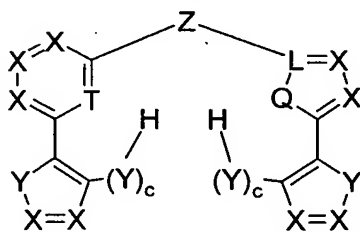
## Compounds (52)



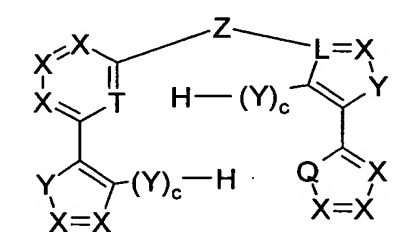
### Compounds (53)



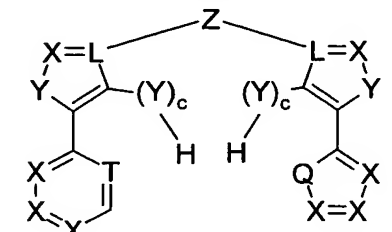
### Compounds (54)



## Compounds (55)

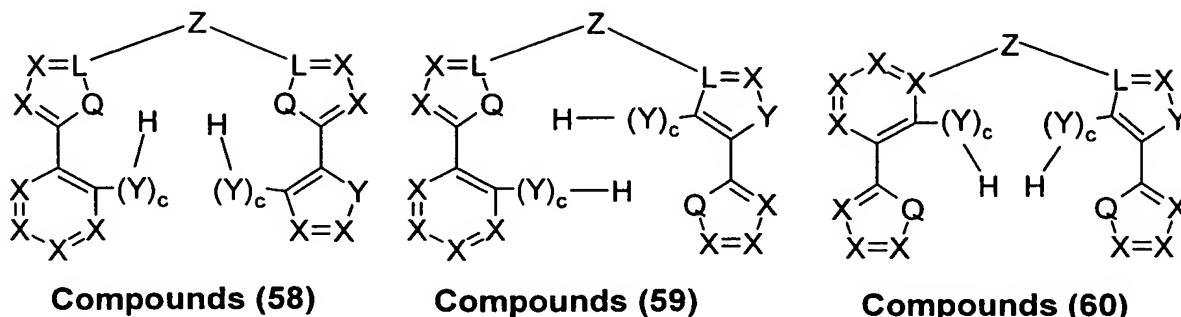


### Compounds (56)



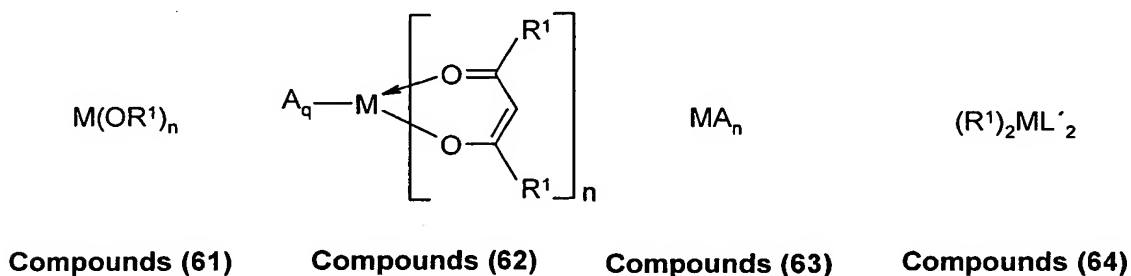
### Compounds (57)





where the symbols and indices L, Q, T, X, Y, Z, R, R<sup>1</sup>, R<sup>2</sup> and c have the same meanings as in Claim 7, apart from the compounds bis(6-phenyl-2-pyridyl)methane, bis(6-phenyl-2-pyridyl) ketone, bis(6-(1-hydroxy-3,5-di-tert-butyl)phenyl-2-pyridyl)-methanol, 2,2'-thiobis(3-cyano-2,4-diphenyl)pyridine, bis(6-(3-phenyl)phenyl-2-pyridyl)methane and isomers.

21. Process for the preparation of the compounds according to one or more of Claims 1 to 19 by reaction of compounds (31) to (60) according to Claim 20 with metal alkoxides of compound (61), with metal ketonates of compound (62), metal halides, carboxylates, nitrates and sulfates of compound (63) or alkyl- or arylmetal compounds of compound (64)



where the symbols M and R<sup>1</sup> have the meaning given in Claims 5 and 6, and the symbol A = F, Cl, Br, I, OH, formate, acetate, propionate, benzoate, nitrate or sulfate, and L' is a monodentate ligand and n = 1, 2 or 3 and q = 0, 1, 2 or 3.

22. Compounds according to one or more of Claims 1 to 19, characterised in that their purity (determined by <sup>1</sup>H-NMR and/or HPLC) is greater than 99%.

23. Conjugated, partially conjugated and/or non-conjugated polymers or dendrimers containing one or more compounds of structure 1 or compounds (1) to (30) according to one or more of Claims 1 to 19.

24. Polymers or dendrimers according to Claim 23, characterised in that at least one radical R defined in Claim 5 represents a bond to the polymer or dendrimer.

25. Polymers according to Claim 23 and/or 24, characterised in that the polymer is selected from the group of the polyfluorenes, polyspirobifluorenes, poly-para-phenylenes, polydihydrophenanthrenes, polyindenofluorenes, polycarbazoles, polythiophenes, polyketones, polyvinylcarbazoles or from copolymers which have a plurality of the units mentioned here.

26. Electronic device comprising at least one compound, a polymer, a copolymer or a dendrimer according to one or more of Claims 1 to 19 and 22 to 25.

27. Electronic device according to Claim 26, characterised in that it is an organic light-emitting diode (OLED), an organic integrated circuit (O-IC), an organic field-effect transistor (OFET), an organic thin-film transistor (OTFT), an organic solar cell (O-SC) or an organic laser diode (O-laser).